



LUMINARY MEMO #339

To: Distribution  
From: D. Eyles  
Date: 14 April 1972  
Subject: Latest EMP 103B

Here is the latest word on EMPs for a failed CDUX. The previous version (Luminary Memo 235, rev. 1), you'll remember, discouraged DAP activity in yaw by enlarging the deadband. This version does it by changing the phase-plane parameters for the p-axis to vastly enlarge the coast region. For good measure CDUX, CDUXD, DELCDUX, OMEGAPD, and DELPEROR are zeroed.

The result is a DAP which is totally quiet in the yaw axis. It does not react to ACA yaw deflections. Control in this axis can be exercised in "direct" without interference from the DAP. Control in the other axes is normal, in auto or attitude-hold, as long as real vehicle yaw is kept close to zero.

The disadvantage of this version, with respect to the old one, is that no acceleration command capability in yaw is available from the autopilot. The advantages are that control in other axes is not prejudiced by enlarging the deadband, and that jet firings are prevented even in such odd runaway cases as that simulated at Grumman. There remains a one-in-five (or less) chance of a jet firing every 2 seconds, if the DAP gets in before the downrpt following the phase-plane set-up in 1/ACCS, but this has had no noticeable effect on control in simulations at Grumman and MIT.

In the now familiar way, the EMP is loaded into vac area 5 and enabled with V 31 E after noun 26 has been appropriately loaded. The EMP, in two forms, follows:

# EMP FOR A FAILED CDUX

The EMP quiets PGNCS autopilot activity in the p-axis (yaw) in the event of a frozen or runaway CDUX. The DAP will not respond to stick deflections. Control in yaw can be exercised in the direct mode. Control is normal in other axes as long as real vehicle yaw is kept near zero.

N 26 load:

V 25 N 26 E 1 E 675 E 10100 E

Start-up procedure:

V 31 E

660	00000	reserves VAC5	710	55556	TS	BLOCKTOP +
661	35006	CA EBANK6	711	55557	TS	BLOCKTOP +
662	54003	TS EBANK	712	55564	TS	BLOCKTOP +
663	34746	CA ZERO	713	55565	TS	BLOCKTOP +
664	54660	TS VAC5USE	714	34727	CA	BIT14
665	54032	TS CDUX	715	55560	TS	BLOCKTOP +
666	54634	TS CDUXD	716	55561	TS	BLOCKTOP +
667	55637	TS DELCDUX	717	55562	TS	BLOCKTOP +
670	55642	TS OMEGAPD	720	55563	TS	BLOCKTOP +
671	55274	TS DELPEROR	721	10752	CCS	PHASE1
672	55550	TS BLOCKTOP +2	722	03532	TC	DNPHASE2
673	55551	TS BLOCKTOP +3	723	05355	TC	PHASCHNG
674	00710	TC 710	724	07011	OCT	07011
675	34746	CA ZERO	725	77777	OCT	77777
676	54660	TS VAC5USE	726	00675	OCT	00675
677	30731	CA 731	727	10100	OCT	10100
700	54335	TS DNTMGOTO	730	03532	TC	DNPHASE2
701	05263	TC TASKOVER	731	00661		starting address of EM

Loads for EMP 103B:

Load 1:      V 71 E  
              24 E  
              660 E  
              E  
              35006 E  
              54003 E  
              34746 E  
              54660 E  
              54032 E  
              54634 E  
              54637 E  
              55642 E  
              55274 E  
              55550 E  
              55551 E  
              710 E  
              34746 E  
              54660 E  
              30731 E  
              54335 E  
              5263 E  
              V 33 E.

Load 2:      V 71 E  
              24 E  
              710 E  
              55556 E  
              55557 E  
              55564 E  
              55565 E  
              34727 E  
              55560 E  
              55561 E  
              55562 E  
              55563 E  
              10752 E  
              3532 E  
              5355 E  
              7011 E  
              77777 E  
              675 E  
              10100 E  
              3532 E  
              661 E  
              V 33 E